Regional Growth Dynamics in the Service Sector: The Determinants of Employment Change in UK Regions 1971-2005

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Abstract

There is a need to better understand the dynamics relating to the evolving economic structure of regions, in particular factors concerning deindustrialisation and the growth of service sector activities. In order to unpick the dynamics relating to contemporary regional evolution, this paper examines regional employment in the UK's service sector from 1971-2005. The analysis utilises the statistical technique of multi-factor partitioning to examine the evolutionary dynamics of employment change in the UK service sector. Overall, differing growth trajectories in service sector employment across regions appear to be the result of the different underlying industrial structure observed within the regions themselves. The findings indicate that the industrial structure of a region has a significant influence on employment change in the service sector, with related variety being of greater consequence than specialisation. This suggests that diversity, or urbanisation, effects have a greater influence than specialisation effects on 'lighter' industries than 'heavier' industries. Spatio-temporal variations within the development of the service sector are evident in the analysis and there is evidence of convergence across the regions for all sub-sectors examined. It is concluded that in an increasingly service dominated economy, diversity and related variety have some weight in explaining regional development paths.

1. Introduction

It has been suggested that explaining the economic development within sub-national territories is one of the great challenges currently facing social science researchers (Storper 2010). Despite this challenge, scholarly work in this area has been described as having taken a 'quantum leap' over the past half century, resulting in a wealth of literature examining this very issue (Barca et al. 2012). Nevertheless, there is a still a need to better understand the dynamics relating to the evolving economic structure of regions, in particular factors concerning the ongoing deindustrialisation of regional economies and the growth of service sector activities. In the context of the UK, for example, the fact that the service sector is dominant in terms of GVA and employment is beyond debate (Jones 2013). Indeed, the increasing role of the service sector was the dominant feature of advanced economies over the last decades of the Twentieth Century (Daniels 1991; Triplett & Bosworth 2004; Uppenberg & Strauss 2010; Marato-Sanchez & Cuadrado-Roura 2011). Therefore, the rise of the service sector has refashioned the economic geography of the UK, as well as many other developed countries (Massey, 1985; Bryson & Daniels, 2007).

However, the service sector cannot be considered to be a single homogenous group but a diverse set of sub-sectors (Massey 1984; Beyers 2010; Jones 2013). Indeed, the term 'service sector' has come to describe all tertiary sectors of the economy, outside of the primary and manufacturing sectors (Illeris 2007). Previously, the service sector has be viewed as being comprised of four broad groups: distributive services, producer services, personal services and social services (Browning & Singlemann 1975), of which the focus is usually on the first three private sector value generating groups. Increasingly, the examination of services in the regional develoment process in the context of advanced economies focuses on what have been termed as knowledge-based services (Miles & Boden 2000), particularly the roles of both financial services and Knowledge Intensive Business Services (KIBS) in generating innovative, high value added outputs (Huggins 2011; Beaverstock et al. 2013; French et al. 2011). In addition, the contributions of what have been termed ‘consumption-based’ services, such as retail and leisure services, in the regional development process has also attracted attention, as post-industrial cities and regions become less dependent on production and more dependent upon becoming centres of expenditure on 'experience' goods such as shopping, dining and entertainment (Zukin 1998; Crewe 2001; Johnston 2009; Johnston 2011).

The process of deindustrialisation and service-isation of advanced economies is typically characterised by persistent 'regional problems', the perpetuation of a core-periphery pattern of spatial development, with slow growing peripheral regions dominated by

stagnant/declining heavy industries versus dynamic regions built around light/high/new technologies and services (Rowthorn 2010). In the UK context, this is characterised by the continuing north-south divide, a pattern that some see as always being a feature of its economy, with its origins in the inter-war period and the emergence of new light/consumer based industries (Crafts 2005; Scott 2007); while others suggest the divide really gathered real momentum in the 1950s/60s (Massey 1984), and becoming entrenched as a feature of the modern UK economy (Gardiner et al. 2013). This process is covered at length elsewhere in the extant literature (Massey 1984; Scott 2007; Gardiner et al. 2013), suffice to say that as more emphasis is placed upon understanding the reasons behind and achieving balanced growth (Gardiner et al. 2013; Hildreth & Bailey 2013; Martin 2015), there is a need to examine this in light of the dominant sectors of the economy, i.e. services. The crude distinction between and industrial north and service dominated south appears to be a rather rudimentary analysis of the state of regional development in the UK. While it is undoubtedly true that the pattern of regional development in the UK does reflect such a divide, it glosses over the potential nuances of the situation. For example, it firstly suggests that services sector employment has not flourished in peripheral regions. Secondly, it ignores questions concerning how service sector employment evolved across the UK regions Can we consider all regions to similar or do they exhibit different patterns of service sector development? In addition, are all service sub-sectors homogenous in their growth patterns?

From a theoretical perspective, scholars are increasingly turning towards evolutionary approaches in economics and economic geography in order to explain observed changes in the industrial composition of an economy and, following from this, its spatial organisation (Boschma & Frenken 2006; Frenken & Boschma 2007; Hassink et al. 2014; Coenen et al. 2016). Such an evolutionary approach can be considered to encapsulate a range of theoretical strands, but three in particular. First, the role of *related variety* and *specialisation* within regional economies as manifest by the degree of interrelatedness within and across economic activity. A second theoretical strand suggests that the geographic movement of industries is related to the capacity of regions and cities to effectively absorb the productive capacities of these industries. Once certain regions are not longer able to absorb such capacities a geographic reconfiguring occurs, which Harvey (2001) has termed a *spatial fix*. Third, the role of *regional context*, such as the unique assets and resources of each region, including industrial composition as well as socio-spatial and institutional features. The aim of this paper is to examine the extent to which each of these three theoretical strands of regional development

theory may best explain the growth dynamics and evolution of regional service sector economies, based on an empirical analysis of regions in the UK.

In order to unpick the dynamics relating to the more contemporary regional evolution, this paper examines regional employment in the UK's service sector from 1971-2005 in order to assess the factors driving the changes and to examine the differing regional dynamics in these changes. For the purposes of this paper, the service sector is divided into four sub-sectors covering the whole of the private sector: business services, financial services, retail services and leisure and cultural services. Consequently, the analysis in this paper examines these four sub-sectors of the serivce economy as they capture the main value adding components of a regional economy in advanced economies such as the UK. Indeed, these sectors account for approximately 50% of overall economic activity in the UK, and around two thirds of the value created by the entire service sector.[1] This approach allows an examination of changes in employment in both 'traded' services, i.e. those where their markets extend beyond the immediate home region, such as financial and business services, and consumption-based sectors, such as retail and leisure and cultural services, whioch tend to be 'non-traded' in nauture, i.e. more reliant upon the region for their demand (Kaldor 1970; Zukin 1998; Warf 2010; Johnston 2011). The following analysis is at an aggregated level, focussing on NUTS 1 regions; while the internal diversity of these spatial units may be substantial, this approach offers a finer examination of the issue than other studies that focus on a dichotomous UK comprised of a 'north' and a 'south' (Rowthorn 2010; Gardiner et al. 2013).

The analysis utilises the statistical technique of multi-factor partitioning to examine the evolutionary dynamics of employment change in the UK service sector. The paper's contribution to knowledge centres on synthesising the three main strands of work indicated above in order to assess how these explain the dynamics of service sector employment across the regions of the UK. As such, the results highlight the importance of one strand of theory, that of related variety within a region, to the growth dynamics of the service sector employment. It also illustrates that differing regional, sectoral and temporal growth dynamics exist across both the sub-sectors of the service sector and the regions of the UK.

The remainder of the paper is organised as follows: Section 2 outlines the literature that builds the conceptual framework. Section 3 sets out the context of the UK service sector and highlights the data sources and statistical technique used for the analysis, before section 4

[1] Authors' calcualtions based on data from the Office for National Statistics

presents the results. Section 5 then discusses these findings in light of the conceptual framework, before concluding with a discussion of the implications of the findings.

2. Conceptual Background and Theoretical Framework

Conceptualising and explaining the regional growth process has a rich history in the pantheon of economics and geography literatures, endeavouring to understand the process and also to provide an explanation for uneven patterns of economic development (Storper 2010; Harris 2011; Henley 2005; Audretsch & Fritsch 2002). Underpinning the conceptual framework of this paper is the notion of evolutionary economic geography, which provides a dynamic lens through which the changing regional economy can be viewed, partly rejecting and partly complementing the rational agent models of the New Economic Geography and assumptions based around finding a spatial equilibrium for various economic processes (Boschma & Frenken 2006). Instead "evolutionary approaches aim to explain the spatial *evolution* of industries and networks at the meso-level of the economy" (Boschma & Frenken 2006).

In order to understand the spatial and temporal evolutionary paths of the services sector in the UK, we begin by outlining our conceptual approaches by highlighting three main strands in the economic geography literature that seek to explain regional economic development, approaches based on (1) related variety and specialisation; (2) spatial fixes and (3) regional context. Indeed, these approaches can essentially be presented as dichotomous; those that point towards the heterogeneity of territories and hence would adovcate place-based policy responses, tailored to these individualities (regional context and related-variety approaches), and those that suggest that uneveness is the outcome of a more universal development process, advocating people-based or spatially blind policy responses (specialisation and spatial fix approaches) (Thissen & Van Oort 2010; van Oort et al. 2014; Barca et al. 2012). As such, the dichotomy concerns the extent to which regional development within a capitalist system can, or will, be even or uneven (Gardiner et al. 2013)?

These debates are important with respect to the development of the service sector, and its increasing importance in terms of regional economic development (Begg 1993). Its importance is reinforced through a wide range of recent literature, centring on the increasing importance of service sector firms for innovation (Freel 2006), the financialisation of the modern capitalist economy and its influence on the regional development process (Pike & Pollard 2009; French et al. 2011; Beaverstock et al. 2013), and the increasing importance of knowledge intensive service firms in terms of employment (Johnston 2009; Yigitcanlar 2010; Huggins 2011; Johnston 2011). While these developments in the extant literature highlight the

importance of the services sector for growth, they also raise important questions such as: what development path has the secor taken, has employment in this sector evolved evenly, and what are the factors driving changes in employment?

2.1 Related Variety and Specialisation

There is a large literature that suggests that the growth of a region, as well as its overall development, is linked to its industrial structure and how this gives rise to agglomeration economies (Audretsch 1998; van Oort et al. 2014). Debates within the literature often focus on whether these agglomeration economies arise from the specialisation or diversification of the regional economy (van Oort et al. 2014). This section focuses first on the economies generated by the diversification of the firm base of a region, building on the work developed by Jacobs (1969). The basic argument underpinning this idea is that when there is a broad the set of economic activities occurring within a given region, geographic proximity will faciltiate higher the levels of innovation and knowledge transfer, fostering growth and development (Asheim et al. 2011). However, this has been criticised as too simplistic; why should geographic proximity necessarily induce knowledge spillovers between unrelated activities? For this to occur, it is argued that some degree of inter-relatedness is required (Hartog et al. 2012; Asheim et al. 2011; Boschma & Iammarino 2009).

Such inter-relatedness is referred to as related variety (RV), typically focused on technological inter-relatedness, i.e. relying not necessarily on geographic proximity but technological relatedness, knowledge bases and cognitive proximity which provide the relevant absorptive capacity to render knowledge spillovers useful (Aguilera et al. 2012; Boschma 2005; Cohen & Levinthal 1990; Cowan et al. 2000). As such, a range of empirical work has demonstrated that related variety has a positive effect on regional growth (Frenken et al. 2007; Bishop & Gripaios 2009; van Oort et al. 2014; Boschma et al. 2011). In addition, related variety has been shown to increase trade flows (Boschma & Iammarino 2009), have a positive effect on start-ups (Bishop 2012) and provide firms with greater opportunities for procuring inputs reducing the need for vertical integration (Cainelli & Iacobucci 2012). However, it may be that high-technology sectors benefit more than low technology sectors - high tech RV rather than RV per se (Hartog et al. 2012).

While some work has highlighted the benefits procured by the diversification of the economy, a parallel set of literature extols the virtues of regional specialisation as the basis of competitiveness. Taking its intellectual lead from the work of Alfred Marshall (Marshall 1890), this approach to regional economic development is encapsulated by the New Economic

Geography literature which views the agglomeration of economic activity as central to the process (Krugman 1998; Storper 2010), with centrifugal forces pulling activity into a place generating positive externalities that creates a virtuous circle of localisation and specialisation (Lucas 1988; Malmberg & Maskell 2002). In this case, scale is important as existing growth reinforces new growth, differentiating it from the aforementioned related variety approach which stresses diversity.

From this perspective, regional specialisation is considered to generate external economies available to all those located within the given location, through attracting labour with the required skills, specialised suppliers and generating knowledge spillovers (Marshall 1890; Arrow 1962; Romer 1986; Krugman 1991). Successful regional economies, therefore, are based around clusters of successful/competitive firms in related industries and their associated support institutions, such a universities and research labs (Saxenian 1994; Porter 1998; Audretsch & Feldman 1996; Audretsch 1998). Particular emphasis has been put on knowledge spillovers as the key externality of agglomeration, with the geographic proximity of agents facilitating the transfer of knowledge (Glaeser et al. 1992). Scholars working in this area have tended to focus on high technology and creative clusters (Doloreux & Shearmur 2012; Audretsch & Feldman 1996; Henry & Pinch 2001; Florida et al. 2011; Scott 2005; Storper 1989), although some consideration has also been given to lower technology sectors (Maskell 1998; Sabonienė et al. 2014). Consequently, clusters or agglomerations are responsible for generating intense, repeated, interactions and 'local buzz' that enable the spread of knowledge among geographically proximate actors (McCann 2007; Storper & Venables 2004). The resulting pattern of development is therefore one of core - periphery, with spatially unbalanced growth the outcome and aided by policies that are 'space-neutral' or 'people-focused'.

2.2 The Spatial Fix

Marxist approaches to economic geography have long been interested in the uneven distribution of economic activity. Harvey's (2001) work on the geography of the capitalist system stresses its internal contradictions and the periodic crises that promotes expansion and restructuring, as a means of tackling problems created by over-accumulation and the resultant devaluation of capital. In these cases, capitalism requires a spatial fix in order to relieve these immediate problems and allows capital to maintain its hegemony. Consequently, as Jessop (2006) notes, the spatial fix must be considered to be temporary as the instability of the system generates new solutions to the problems created. Capitalism, therefore, needs constant change

and expansion in order to survive continually changing in its search for markets and resources (Harvey 2001). Geographically, this manifests itself with movements from previous heartlands to new locations in order to tackle the problem of over-accumulation and the "geographical expansion, reorganization, and reconstruction that absorb surplus capital and labour" (Arrighi 2003) and, ultimately, the deepening of the capitalist system across space (Schoenberger 2004).

Allied work by Harvey introduces a temporal dimension to the idea of a spatial fix (Harvey 1996). In this case, changes in the distribution of industry over both space and time are inherent features of the capitalist system as expansion and contraction occur in either or both of these dimensions (Jessop 2006). The de-industrialisation and hollowing out of industrial areas are two of the consequences of this process, as (Harvey 2003) himself notes "if capital does move out, then it leaves behind a trail of devastation and devaluation; the deindustrializations experienced in the heartlands of capitalism... in the 1970s and 1980s are cases in point" (Harvey, 2003, pg. 116), giving rise to the many problems associated with 'old industrial regions' (Steiner 1985).

The constant motion of capital means that commodity exchange through markets is increasingly spatial, involving movement from one place to another. This Harvey argues "produces spiralling inequalities between regions and spaces insofar as these regions and spaces possess differential endowments. The outcome is that rich regions grow richer and poor regions grow relatively poorer" (Harvey, 2001, pg. 29). Therefore, the spatio-temporal fix can be considered to be a form of path dependency or cumulative causation. Differing regional endowments of labour and resources, as well as potential market size, will thus vary according to the starting conditions of each region in terms of these factors.

The continued resilience of regions, therefore, is about avoiding what Harvey terms a 'switching crisis', or the problems associated with the migration of capital out of a region. If the fix is in favour of a region, then it relates to embedding the existing capital in order to 'fix investments spatially' (Harvey, 2001, pg. 28). In light of a service sector focus, this would entail the embedding of tradable services in a region. This spatial fix can be seen as the solution to a problem of over-accumulation. A tradeable service can be offered across many markets, with capital not being required to migrate to those regions in order to serve those markets. In addition, agglomeration effects can 'lock in' a particular sector to a particular place, i.e. the territorialisation of a sector (Storper 1997; Zhou et al. 2010). This, however, appears to highlight a contradiction, i.e. if the fix is temporary then how do some processes/industries/sectors become territorialised? Harvey argues that this merely highlights

the contradictions of capitalism in that spaces are fixed to allow accumulation, but as subsequently broken down at a future point in time to accommodate a new fix (Harvey 2001).

2.3 Regional Context

The role of context and regional differences underpins the literature on 'place-based regional development, with location being of importance due to the unique social, cultural and institutional features (Barca et al. 2012; Thissen & Van Oort 2010). Regions are unequal due to different endowments of resources, both tangible and non-tangible, making complete equality an impossiblity. This is reflected in the differing levels of regional development found across territories (Huggins 2003; Huggins & Thompson 2010). In addition, further evidence of the influence of the specific endogenous characteristics of regions has been posited in the form of the unique institutional environments found in each region, and the extent to which these influence growth (Rodríguez-Pose 2013). Consequently, the specific institutional environment within a region has been found to be an important determinant of performance, although significant variations over time and space have been shown to act as a barrier to determining an 'optimal' set of institutions to promote growth and development (Rodreiguez-Pose, 2013).

In terms of regional industrial context, one of the first branches of literature focusing on regional characteristics as a determinant of economic change is Kaldor's model of regional economic growth, which stresses the role of a strong traded sector at the heart of the regional economy, with growth stemming from both the home (or regional) market and external markets (other regions). This is an important step in recognising that different regional structures may explain ensuing regional growth and development (Kaldor 1970). The model, formalised by Dixon & Thirlwall (1975), suggests that regional competitiveness is determined by industrial composition, with those regional economies focused on producing goods and services with higher income elasticities of demand that, in turn, promote technical progress outperform other regions (Dixon & Thirlwall 1975). As such, economic development is embodied in the production of knowledge-based goods and services that require higher levels of human capital and knowledge to create (MacKinnon et al. 2002). Consequently, lagging regions find themselves in this position due to the existence of a weak trading sector within their economy (Thirlwall 1980). In light of these developments the policy remedy for lagging regions typically proposes a emphasis on export promotion in terms of focusing on these sectors that and import substitution in order to develop these sectors based on domestic demand.

Regional disparities, therefore, arise from the differences in each region's traded sector, with a larger proportion of employment in these sectors equating to higher levels of growth and vice versa (Harris 2011), highlighting a process of cumulative causation. This focus on cumulative causation chimes with the themes of the evolutionary economic geography approach, within self-reinforcing mechanisms promoting regional development and, consequently, the process becomes is significantly path dependent (Boschma & Frenken 2006; Arthur et al. 1987; Arthur 1989). Therefore, the process of regional economic development can have a unique outcome in each region since it is not a matter of understanding how this process tends towards a single equilibrium, but a matter of plotting the unique paths of each region.

3. Research Approach, Data and Methods

In light of Storper's call for a focus on the "allocation and adjustment of spatial patterns … as well as major causes of growth and change" (2011, pg. 14), the analysis presented here utilises a methodology that focuses on explaining 'real' change and understanding observed events. Therefore, the analysis seeks a richness in what Storper describes as "'on the ground' accuracy [with] few degrees of freedom" (Storper, 2011, pg 12). Given this, the approach is based around examining the underlying patterns within the data and breaking down these effects into their component parts. This is not an attempt to outline an optimum growth path, but instead presents an analysis of the actual growth path of the service sector across the regions of the UK.

The conceptual framework outlined in the previous section highlights three potential avenues to explore and poses the following research question: can the regional growth dynamics of the UK service sector be attributed to the role of related variety or specialisation, a spatial fix or regional context. From this, then, it can be deduced whether the pattern of development observed is fixed or variable. The dataset containing employment changes in the service sector from 1971-2005 reflects the economic shocks that have occurred during this period, whilst also having comprehensive spatial coverage of the UK, allowing both the temporal and spatial dimensions to be considered.

3.1 Statistical Techniques

Understanding the distribution of economic activity has a long heritage within the extant literature, dating back to the UK's Barlow Report of 1940 (Royal Commission on the Distribution of the Industrial Population 1940; Ray et al. 2012). The shift-share technique has

been utilised by a vast number of studies in order to examine changes in regional employment (Ray et al. 2012).

Whilst this technique has been widely discussed and utilised (see Ray et al., (2012) for a discussion), it has been criticised for the static nature of the analysis produced (Gardiner et al. 2013), as well as for what has been described as a 'fundamental flaw' in terms of a bias introduced by using different industry weightings for each region rather than a standardised national weighting (Ray et al. 2012). Thus, regional effects are not measured correctly, introducing a single regional effect into the model whereas in reality this may vary according to the industry (Ray et al, 2012, pg. 300). The multi-factor partitioning technique was developed in response to these criticisms, using standardised national weightings to decompose regional growth into its component parts. Essentially, this technique decomposes the rate of employment growth within a certain sector from that of the nation and then examines this difference in terms of four effects: (1) the region effect; (2), the industry mix effect; (3), the regional interactions effect; and (4) the allocation effect. The standardised weightings are calculated as follows:

$$\hat{r}_{\cdot j} = \sum_i r_{ij} \frac{x_i^0}{x_n^0} \qquad \text{(Equation 1)}$$

Where the standardised growth rate of employment in region j is weighted by the proportion of employment in industry i within that region.

$$\hat{r}_{i\cdot} = \sum_j r_{ij} \frac{x_j^0}{x_n^0} \qquad \text{(Equation 2)}$$

Where the standardised growth rate of employment in industry i is weighted by the proportion of employment in region j.

$$\hat{r}_{\cdot\cdot} = \sum_i r_i \frac{x_i^0}{x_n^0} = \sum_j r_j \frac{x_j^0}{x_n^0} \qquad \text{(Equation 3)}$$

Where the standardised growth rate of national employment is weighted by the proportion of employment in both industry i and region j

Once these standardised growth rates are calculated the growth rates are partitioned according to the following equation:

$$E_{.j}^{0}\left(r_{.j}-r_{..}\right)=\sum_{i}E_{ij}^{0}\left(\hat{r}_{.j}-\hat{r}_{..}\right)+\sum_{i}E_{ij}^{0}(\hat{r}_{i.}-\hat{r}_{..})$$

(1) (2) (3) (Equation 4)

$$+\sum_{i}E_{ij}^{0}\left(r_{ij}-\hat{r}_{i.}-\hat{r}_{.j}-\hat{r}_{..}\right)+\sum_{i}E_{ij}^{0}(\hat{r}_{..}-r_{..})$$

(4) (5)

This yields the difference between regional and national growth (1); the region effect (2), the industry mix effect (3), the regional interactions effect (4) and the allocation effect (5).

This statistical technique maps onto the conceptual framework as each effect can be viewed as a proxy for each of the literatures reviewed. With regard to the 'region effect', this focuses on growth that can be attributed to the region itself, highlighting the contribution of the local socio-economic conditions to employment growth, geographic location or population size. This applies equally to all industries within a region and fits with the theoretical strand concerning *regional context*. Consequently, it is argued that where these effects are shown to be prevalent then regional context can be viewed as the key to development.

The framework provides two measures focusing on the industrial structure of a region. The first, the 'industry mix effect', highlights how the specific combination of sectors within a given region contributes to employment growth, providing a useful proxy with which to examine the role of *related variety* in regional economic development. While others have conceptualised this factor using alternative means (Frenken et al. 2007; van Oort et al. 2014), in this case the factor highlights the role of the blend of employment opportunities within a region and offers an insight into the role of variety. As the dataset examines sub-sectors of the services sector, it is argued here that this may also highlight the role of the blend of employment across a set of inter-related sectors.

Second, the 'regional interactions effect highlights relative regional changes in employment net of regional or industry effects, reflecting the existence of specific advantages for a particular industry in a particular location (Ray et al, 2012, pg. 298). Accordingly, this can be seen to be analogous to region specific advantages, offering an effective proxy for examining regional *specialisation* and the accompanying agglomeration economies this generates. Consequently, this effect captures the intangibles that encompass the relationship between industry and place, the 'buzz' generated or, as Marshall eloquently put it, the knowledge that is 'in the air' (Marshall 1890; Storper & Venables 2004).

The final effect, the 'allocation effect', highlights the difference in employment growth between the standardised and crude growth rates, illustrating convergence or divergence

between the regional and the national structure of employment (Cunningham 1969). This is an important measure as proxies the existence of a *spatial fix*, as no convergence in employment across regions would be expected to be observed given the spatial structure of the economy is said to be static at any given point in time, with periodic large adjustments caused by switching crises (Harvey, 2001).

3.3 Data Sources

In order to use multifactor partitioning to analyse the regional growth dynamics within the UK service sector, data on employment at the NUTS 1 level was obtained from the UK Office for National Statistics from 1971-2005, using the Census of Employment (1971-89), the Annual Employment Survey (1991-97) and the Annual Business Inquiry (1998-2005). Growth rates were then calculated for service sector employment in each region on a year-by-year basis with this being partitioned according to equation 1, above, in order to assess each effect.

In order to examine these changes, the first step is to identify the sectors that comprise the service sector. Complicating this approach is the fact that the Standard Industrial Classification (SIC) used for each dataset changed over time. For example, the Census of Employment data for 1971-78 used the 1968 SIC, whereas the data for 1981-89 used the 1980 SIC. Inevitably, there are changes over time as sectors evolve, but the four sub-sectors are broadly similar across the time period (see Appendix 1).

The period 1971-2005 was chosen as this gives a substantial length of time over which to observe changes in employment. This time period covers both periods of expansion and contraction of the economy and also right-leaning and left-leaning governments, and the corresponding economic policies. Therefore, the time period is relatively heterogeneous in terms of events and policies and shows changes over the course of a period of broad changes in the UK economy. Also, the data are comparable over the time periods with the end point of 2005, chosen as this was noted by the ONS as a period of change in data collection techniques, and meant that subsequent years were not comparable. Clearly, the balance between traded and non-traded sectors is important for the development of regional economies (Kaldor,1970), and the analysis aimed to examine both areas of economic activity.

In terms of the sub-sectors examined in this paper, the financial and business service sectors are, typically, seen as 'traded' services as their markets extend beyond the region and even country of the firm (Bryson & Daniels 2007; Warf 2010). Indeed, within advanced economies exports of services, both financial and business services, now accounts for an incraesing proportion of international trade (Freud & Weinhold, 2002). In contrast,

consumption-based sectors such as retail and leisure and cultural services are viewed as being more reliant upon domestic markets for their demand (Zukin 1998; Johnston 2011). As such, the nature of these sub-sectors means that for their 'product' to be consumed, in the main, a consumer must be located within the same region. Thus, these sub-sectors are deemed towards the non-traded end of the scale

4. Results

4.1 Overview of Employment Change in the Service Sector 1971-2005

The analysis firstly examines patterns of employment change in the service sector. Overall, the service sector has shown strong growth during the period, with all four subsectors registering double digit growth across all regions, with the exception of retail service employment in London which declined by around 3% (Table 1). In general, in terms of traded services, employment growth in the business service sector has outstripped growth in the financial services sector during the period. Looking in more detail at the traded sectors of business services and financial services, Table 1 shows that the business services sector has been the best performer in terms of employment growth with employment increasing by 385% across the UK, with all regions registering growth rates of between 200% and 800%. The financial services sector has also recorded strong employment growth in this period, with overall employment increasing by 65% and regional growth ranging from 26% to 145%.

Table 1 About Here

In terms of non-traded services, employment growth in leisure and cultural services grew faster than employment in retail services. Interestingly, employment growth in the retail sector is varied, actually declining in London but growing by up to 96% during the period. For the UK as a whole employment in the sector grew by 45%. Employment growth was higher for the leisure and cultural services sector, with UK employment growing by 101% and regional growth between 61% and 195%.

Figures 1-4 display changes in the employment in each of the four service sectors for the regions of the UK with the national growth rate stripped out, highlighting changes in employment that can be attributed to the regions themselves. These are the changes this analysis seeks to examine and explain by breaking them down into their component parts through the technique of multi-factor partitioning. Prior to this the overall changes in each

sector across the regions are examined and described. Firstly, Figure 1 illustrates that employment in business services experienced a relatively static period throughout the 1970s across all regions; employment began to grow significantly from early 1980s in the London and South East regions and from the mid 1980s across the rest of country. During the period, convergence in employment levels between London and the South East is observed, resulting from a fivefold increase in employment in business services in the South East and a doubling of employment in London. However, the data displays no sign of similar catch-up between London and the remaining UK regions.

Figure 2 highlights a different pattern in employment changes in the financial services sector to that of business services. While the sector experienced a similar increase in employment during the early 1980s this soon reaches its peak and remains stable at this level. In addition, no real convergence between the regions is observed with the bulk of employment being in London at the beginning of the period, with this still being the case at the end of the time period. Indeed, London accounted for 38% of total employment in this sector in 1971, and although this declines over time, the region still accounted for 29% of employment in 2005.

Figures 1-4 About Here

Figure 3 shows that employment in the retail services sector fluctuated strongly over the time period. While employment has grown in overall terms, there are significant periods of decline in the early to mid 1980s followed by substantial growth during the mid 1990s. The striking feature of the employment pattern for this sector is the more even distribution of employment; the large disparities observed in business and financial services sectors are not observed here. While London began the period with the highest levels of employment in this sector, we observe a decline in employment, with the South East region replacing it as the region with the largest levels of employment in the retail sector. Regional growth patterns appear to be pretty uniform, with similar changes occuring at similar times across all UK regions, the magnitude of these changes varies.

Finally, Figure 4 illustrates that employment in the leisure and cultural services sector grew across the period across all regions. Employment growth was steady during the first half of the period and began to increase during the mid 1990s early 2000s. The data shows a relatively uniform pattern of growth across all regions, but with London and South East England being the leading regions for employment in these sectors.

4.2 Drivers of Employment Change

This section examines employment change for each of the four sub-sectors in order to assess the drivers of the observed changes, with each of the effects described in Section 3 examined in turn. The first focus of the analysis is on the region effect and the influence of the regional characteristics on employment in each of the sub-sectors. Table 2 highlights two distinct findings with respect to region effects: 1) the observed effects are similar for each region, i.e. each region displays a similar pattern of employment change, despite possessing different socio-economic characteristics; and 2) the observed effects differ across the four sub-sectors.

The evidence presented in Table 2 and Figure 5 shows that the region effect is largely uniform across the UK; more specifically it appears to be largely benign, with only small changes in employment attributed to this effect. This suggests, therefore, that region effects have not had a significant influence on the dynamics of employment change within the service sector. The only substantial effects noted are in terms of employment within the business services sector where region effects begin to occur from the mid-1990s onwards, and the retail services sector, where effects are observed during the middle of the period. Conversely, in the financial services, and leisure and cultural services sectors no large changes can be attributed to this effect. In addition, the region effects that *are* observed across are different; there is no one 'region effect' identified for the whole of the service sector, instead a region effect that is unique to a particular sector is observed.

Table 2 and Figure 5 About Here

In contrast, the industrial structure of regional economies appears to have a significant effect on employment change in the service sector (Table 3/Figure 6). First, changes due to the 'industry mix effect' closely mirror those of the overall changes in regional employment levels within the four sectors (Figures 1-4), suggesting that the overall structure of the firms within the regions' economies plays an important role in the observed changes in employment. Furthermore, the observed effects differ across both the sub-sectors and the regions, suggesting an element of uniqueness exists in terms of these effects. Thus, as these effects are not uniform in character it would appear that regional differences in terms of variety are apparent. This could also suggest the existence of some hysteresis type effects, i.e. the initial make-up of the regional economy is important in its future development path, perhaps reflecting a process of cumulative causation.

Table 3 and Figure 6 About Here

Table 4 and Figure 7 highlight the specialisation of the regional economy, as demonstrated by the 'region-industry interaction' effect. This effect displays a similar pattern to the industry mix effect, although on a smaller scale. This effect differs by sub-sector and by region, reflecting the uniqueness of the specialisations of each regional economy. It is noted that the business services and leisure and cultural services sector exhibit the largest changes in employment due to this phenomenon. In addition, these effects appear to be reasonably benign until mid-1990s when significant employment growth starts to occur. Within the other two sectors, the effect is much less pronounced.

Table 4 and Figure 7 About Here

Finally, the extent to which the regions are converging or diverging in terms employment across the four sub-sectors are examined in Table 5 and Figure 8, as a means of assessing the existence of a spatial fix within the service sector. Over time there are negative slopes with this effect, providing evidence to suggest that convergence is occurring within all sectors across the regions of the UK (Cunningham, 1969). Again, this varies according to sector suggesting that each is subject to a contrary speed of convergence.

Table 5 and Figure 8 About Here

As summaried by Table 6, the observed effects differ in magnitude across both the regions of the UK and the four sub-sectors of the service sector. The dynamics of employment change appear to be complex, with no one factor appearing to clearly drive these changes alone. The effect that appears to play the largest role is the industry-mix effect. The evidence suggests that it is this effect that has the largest influence on the evolution of employment as it is this one that most closely mirrors the overall changes.

Table 6 About Here

5. Discussion and Conclusion

The analysis has yielded a number of results. First, the observed changes in employment levels within the UK service sector between 1971 and 2005 varied by region and sub-sector. These

variations are manifested in terms of both their magnitude and timing, i.e. they are not necessarily of the same scale and do not always occur at the same time. This is an important finding as it highlights the heterogeneity of the service sector in that it is comprised of many different activities. However, using the broad distinction between traded and non-traded services as a basic dichotomy, there are no clear differences between the two. Instead, intra-group differences are observed, with, for example the business services sector being subject to differing variations than the financial services sector despite them both being towards the traded end of the spectrum. These observations suggest a degree of path dependence exists in that each region, and sub-sector is subject to different growth trajectories (Arthur et al. 1987; Boschma & Frenken 2006).

The differing growth trajectories observed across the regions appear to be the result of the different industrial structure observed within the regions themselves. The industry mix effect has the greatest magnitude of the effects examined. This fits with prior evidence suggesting that related variety is an important driver of growth (van Oort et al. 2014). However, the findings appear to contradict those of Gardiner et al (2013) who found that the industry mix effect on changes in regional GDP was negative for lagging regions which were deemed to have a 'adverse industrial structure' due to the relative decline of these economies (pg. 22). Yet, in terms of service sector employment, this effects has the greatest magniude, a pattern prevalent across all regions. Indeed, the magnitude of this effect generally has the lowest influence in the London region, which, in terms of GDP, has grown significantly faster than the rest of the UK (Gardiner et al, 2013). The differences between the influence of the industry mix on both GDP and service sector employment, then, suggests that there may be variations in the quality of employment changes in each region, with lower value jobs being created outside London.

The influence of the industry mix effect is in someways crucial, with the industrial structure of a region more than partly reflecting the long-term health and stability of its economy. By definition, those regions dominated by declining sectors will not be as dynamic as those dominated by growing sectors. This argument is not new, and forms the basis for regional competitiveness and associated policies that are based on attracting and supporting some sectors over others (Malecki 2004; Kitson et al. 2004; Huggins 2003; Bristow 2005; Huggins & Thompson 2017). Therefore, the fact that employment growth is being driven by industrial structure suggests that the regional development process may be self-reinforcing, creating vicious or virtuous circles accordingly, based on the starting endowment of firms, implying that the spatially unbalanced growth observed in the UK over a similar time period

will be perpetuated (Gardiner et al. 2013). However, the analysis clearly shows employment growth is not determined by this effect alone, it is a combination of this effect plus specialisation effects and some regional effects. Furthermore, the evidence of regional convergence presented in the analysis suggests that change is possible, at least in terms of employment changes.

Overall, the findings suggest that the industrial structure of a region has a significant influence on the geography of employment change across the UK service sector, with the industry mix effect being of greater consequence than specialisation. This result fits with previous work that has found diversity, or urbanisation, effects have a greater influence than specialisation effects on 'lighter' industries than 'heavier' industries (Zang 1998; Nakamura 1985), and this adds to this growing evidence by showing that this result also holds for the service sector. Yet, this does not mean that specialisation has no effect; on the contrary, the results highlight some influence for specialisation, and, in particular, it should be noted that specialisation appears to have more of an effect on the business and leisure and cultural services sectors.

Spatio-temporal variations within the development of the service sector are evident in the analysis and there is evidence of convergence across the regions for all sub-sectors. However, the data suggests a constant evolution in employment rather than showing evidence of a clear structural break that would signify a switching crisis, as described in the literature (Harvey 2001; Harvey 2003; Jessop 2006). Instead, what is observed is the evolution of the employment across the service sector. In order to explain this, it may be that non-traded sectors are not subject to switching crises necessarily as they are relatively territorialised in that they rely on local demand (Storper 1997). Yet, in the sectors that are considered to be towards the traded end of the spectrum, business and financial services, convergence is still observed. Finally, the region effect has been demonstrated to be largely benign across both regions and sector. This is maybe due to the dynamism of these effects; while firm structure can change quickly in terms of new start-ups; institutions in contrast take longer to change. This does not mean that regional context is unimportant, but that these types of effects are more subtle and long term in nature.

The results have suggested that a combination of the characteristics of each region combined with the characteristics of each sector creates a distinct development path with respect to the evolution of employment in the service sector. This regional development path reflects the successful routines and capabilities of the firms located there, and, as these differ across regions and sectors then different patterns of development are observed. As such, this

addresses Storper's call for an approach that "melds structure, events and processes" (2010, pg. 12) in that it gives a clear direction for further research in highlighting that the dynamics of regional growth in the service sector are most highly influenced by the variety of the industrial structure of the regions themselves.

It is concluded that multiple growth paths exist within the service sector, based on region and sub-sector. As such, the insights afforded by the literature on evolutionary economic geography appear to be prescient and points towards an opening of the 'black box' of inter-regional growth via firm performance based around the routines and knowledge that exist within the prevailing industrial structure. The question of how this evolves in one region and not another (Boschma & Franken, 2006) is partially addressed in that the results presented here, which begin to shed some light on the effects that influence development. However, the results also present some further avenues of exploration in this area around the spatial distribution of routines in the service sector and how this influences its development.

The paper's key contribution centres on decomposing the dynamics of change in terms of service sector employment. In doing so, the results illustrate not only the factors driving this process, but also gives a clear insight into the dynamics that drive the process. Regional growth dynamics governing the service sector are complex and vary spatially, as the magnitudes of the effects differ by region, and sub-sector. In an increasingly service dominated economy the current focus on diversity and related variety appears to have some weight in explaining regional development paths (Van Oort et al., 2105).

The policy implications are interesting given the current debates around pursuing place-based or spatially blind regional policy (see Barca et al, 2012). The importance of industrial structure and the relative unimportance of specialisation on employment growth suggest industrial policy should be place-based and spatially sensitive to the existing industrial structure. This is not necessarily about promoting growth of the 'right' sectors or suggesting that a focus on one sector is preferable to another, i.e. pursuing the high road of economic development (Malecki, 2004). That would involve putting normative values on jobs, and, in reality, a region's economy requires traded and non-traded sectors, with each having their place. Jobs in the business and financial services sector tend to be more productive and require greater human capital. Yet, jobs in the retail, leisure and cultural service sectors, and consumption based sectors, offer opportunities for the low skilled, migrant and more flexible workers (Johnston 2009).

In terms of future directions it may be of interest to utilise alternative units of observation in order to see if similar patterns are observed. Hence, looking within regions may

highlight whether or not similar dynamics are observed for sub-regions, as the diversity of NUTS 1 regions can be substantial, given that they often include a number of cities as well as more peripheral areas within their bounds. The only caveat here, at least in the UK context, is that sub-regional data is only available for a shorter time period, but it remains feasible. Finally, breaking down industrial structure may also be of interest in order to attempt to capture related variety and its effect on employment dynamics. Of course, international comparisons would also be useful in order to assess whether these findings are unique to the UK or comparable to regional evolution in other national economies.

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Table 1 Percentage change in sector employment by region 1971-2005

Region	Business Services	Financial Services	Retail Services	Leisure and Cultural Services
North East	560.2	44.9	16.2	61.4
North West	366.9	38.4	28.9	92.4
Yorkshire and The Humber	565.5	116.1	48.6	113.4
East Midlands	737.9	68.8	84.9	184.6
West Midlands	439.2	76.8	55.6	130.9
East	513.8	116.5	96.0	195.5
London	202.8	26.2	-2.99	69.0
South East	561.8	110.7	88.0	145.4
South West	515.8	145.6	70.9	94.7
Wales	527.0	69.2	70.3	108.2
Scotland	371.4	117.3	23.7	58.5
UK	384.5	65.9	45.7	103.1

Table 2: Region Effects on Employment 1971-2005

Region	Business Services % Change	Financial Services % Change	Retail Services % Change	Leisure and Cultural Services % Change
North East	46.76	1.50	2.35	3.25
North West	27.87	1.22	3.71	4.31
Yorkshire and The Humber	45.51	4.29	6.41	5.74
East Midlands	58.81	2.21	11.47	9.92
West Midlands	34.17	2.53	7.31	7.09
East	38.99	3.64	12.61	10.31
London	14.35	0.75	-0.35	3.40
South East	40.42	3.47	10.97	7.24
South West	40.69	4.70	9.62	4.57
Wales	43.97	2.54	9.97	5.77
Scotland	29.03	4.35	3.21	2.56

Table 3: Industry Mix Effects on Employment 1971-2005

Region	Business Services % Change	Financial Services % Change	Retail Services % Change	Leisure and Cultural Services % Change
North East	490.26	41.50	13.23	55.47
North West	295.84	32.60	21.91	76.83
Yorkshire and The Humber	471.73	101.92	38.04	97.97
East Midlands	627.53	61.85	67.48	161.74
West Midlands	363.83	66.80	43.05	111.28
East	430.59	103.44	75.30	168.77
London	156.89	21.02	-1.90	54.69
South East	446.31	94.18	65.50	119.28
South West	434.52	130.64	55.77	83.24
Wales	459.85	63.63	57.24	97.79
Scotland	309.13	102.92	18.42	50.71

Table 4: Region-Industry Interaction Effects on Employment 1971-2005

Region	Business Services % Change	Financial Services % Change	Retail Services % Change	Leisure and Cultural Services % Change
North East	21.24	1.80	0.51	2.53
North West	39.49	4.42	2.82	10.66
Yorkshire and The Humber	44.03	9.54	3.53	9.15
East Midlands	47.16	4.54	5.05	12.16
West Midlands	37.66	7.15	4.48	11.74
East	40.48	9.08	6.91	15.49
London	28.99	4.24	-0.63	10.24
South East	68.66	12.62	9.83	17.75
South West	37.02	9.94	4.73	6.53
Wales	21.18	2.91	2.61	4.41
Scotland	30.38	10.14	1.76	4.95

Table 5: Allocation Effects on Employment 1971-2005

Region	Business Services % Change	Financial Services % Change	Retail Services % Change	Leisure and Cultural Services % Change
North East	-69.82	-19.04	-16.18	-22.48
North West	-52.09	-20.42	-17.91	-28.76
Yorkshire and The Humber	-68.89	-30.54	-20.10	-32.25
East Midlands	-92.88	-25.79	-24.48	-43.00
West Midlands	-63.50	-28.26	-21.40	-32.04
East	-73.38	-37.43	-25.71	-43.96
London	-37.81	-21.28	-14.85	-26.77
South East	-76.99	-37.04	-24.17	-37.72
South West	-67.65	-39.59	-22.31	-30.70
Wales	-65.86	-23.88	-21.79	-29.59
Scotland	-53.10	-28.52	-17.97	-26.75

Table 6: UK Wide Effects on Employment 1971-2005

Effect	Business Services % Change	Financial Services % Change	Retail Services % Change	Leisure and Cultural Services % Change
Region Effect	29.10	2.16	6.02	5.18
Industry Mix Effect	313.61	57.02	35.49	87.39
Region-Industry Interaction	38.22	6.47	3.57	9.95
Allocation Effect	-56.09	-26.22	-19.92	-30.98

Figure 1: Cumulative Regional Employment Growth 1971-2005: Business Services

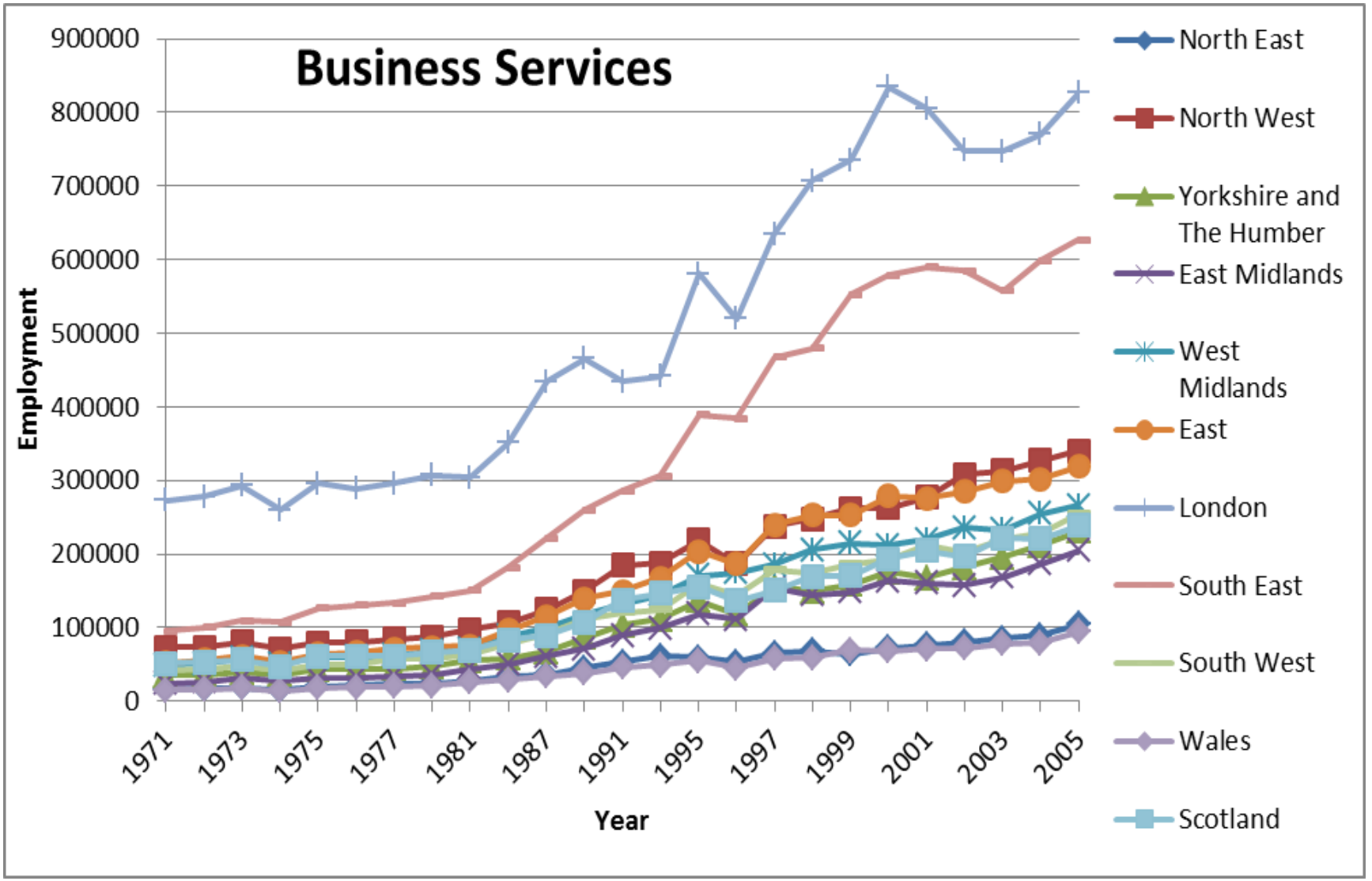


Figure 2: Cumulative Regional Employment Growth 1971-2005: Financial Services

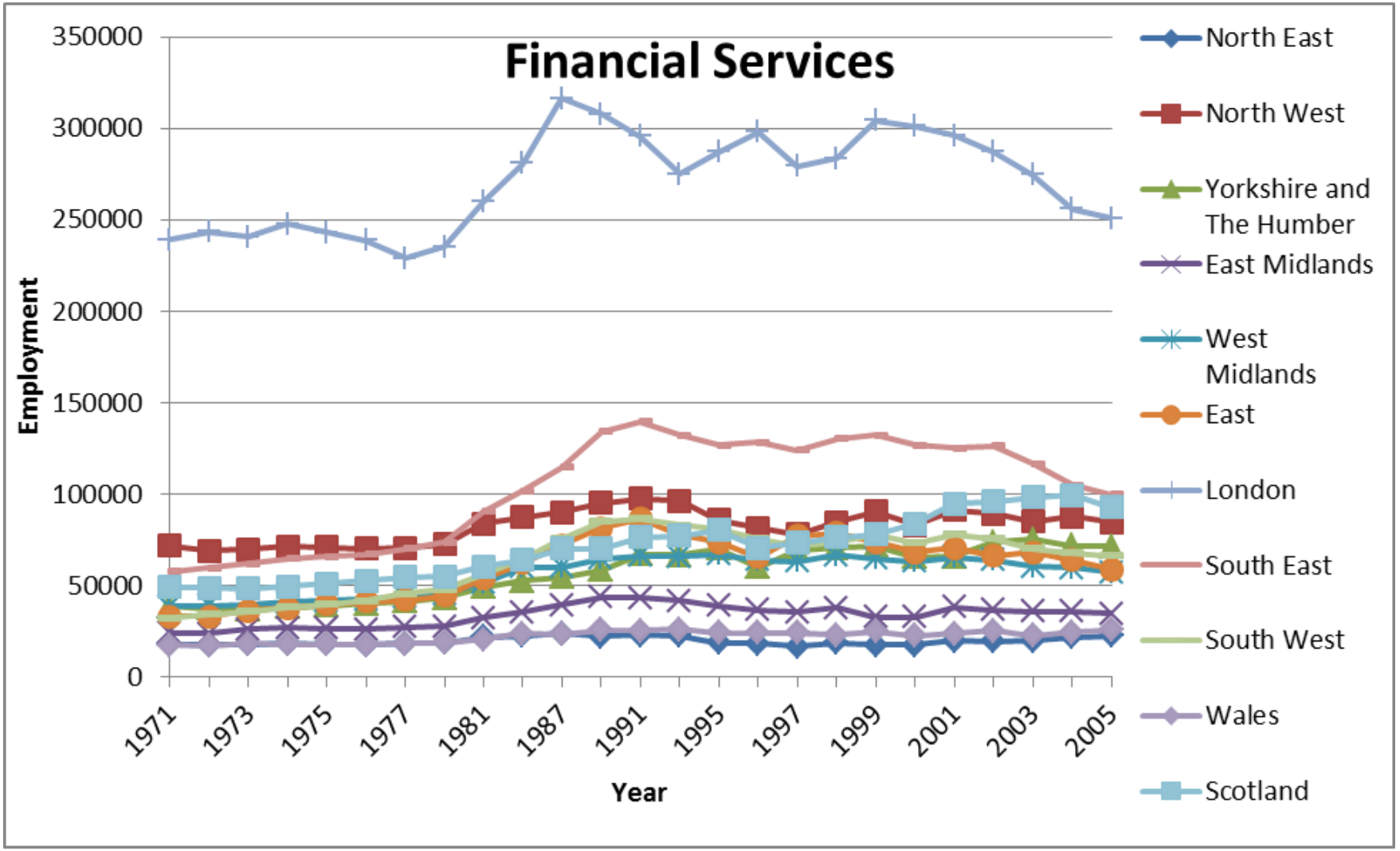


Figure 3: Cumulative Regional Employment Growth 1971-2005: Retail Services

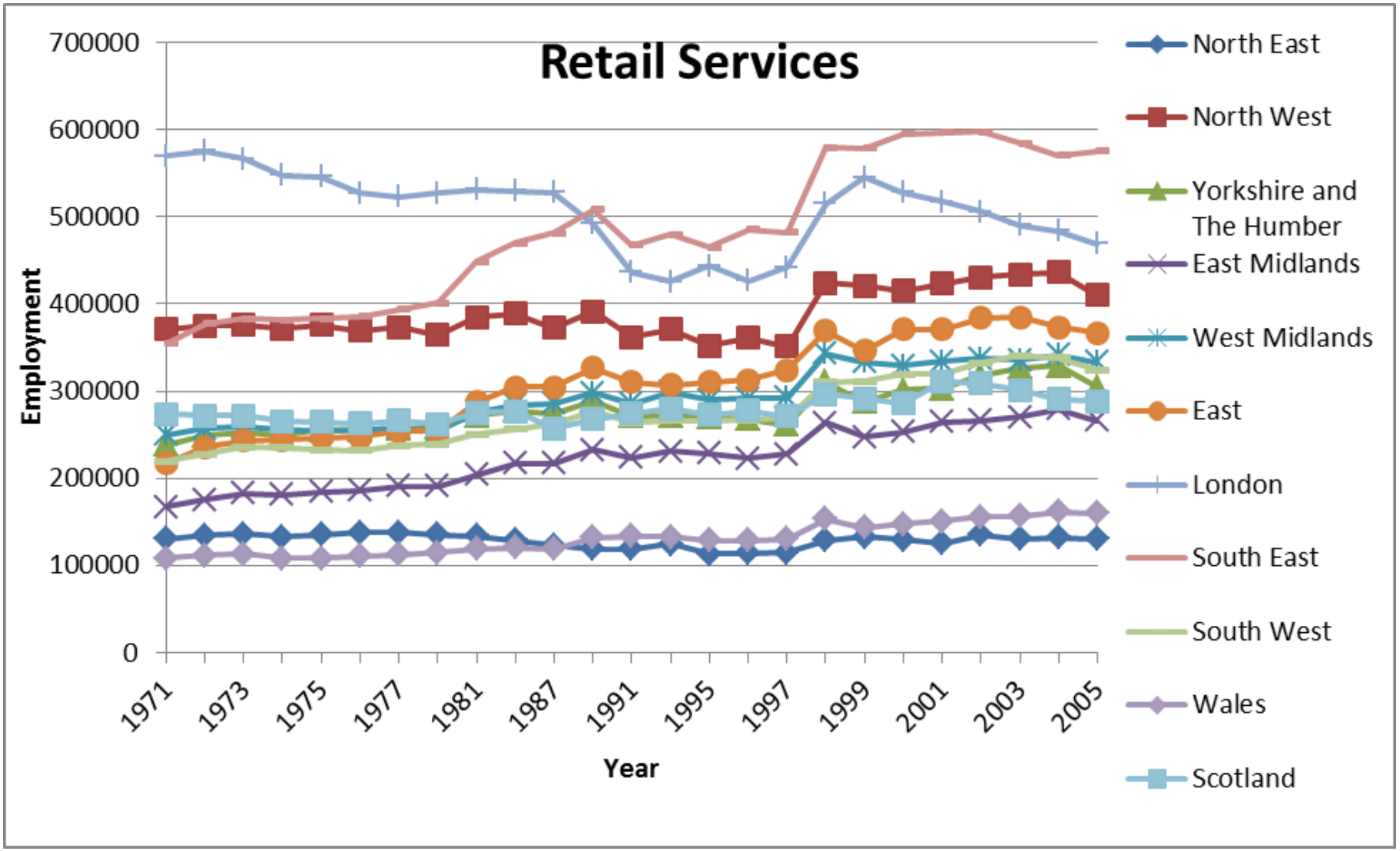


Figure 4: Cumulative Regional Employment Growth 1971-2005: Leisure and Cultural Services

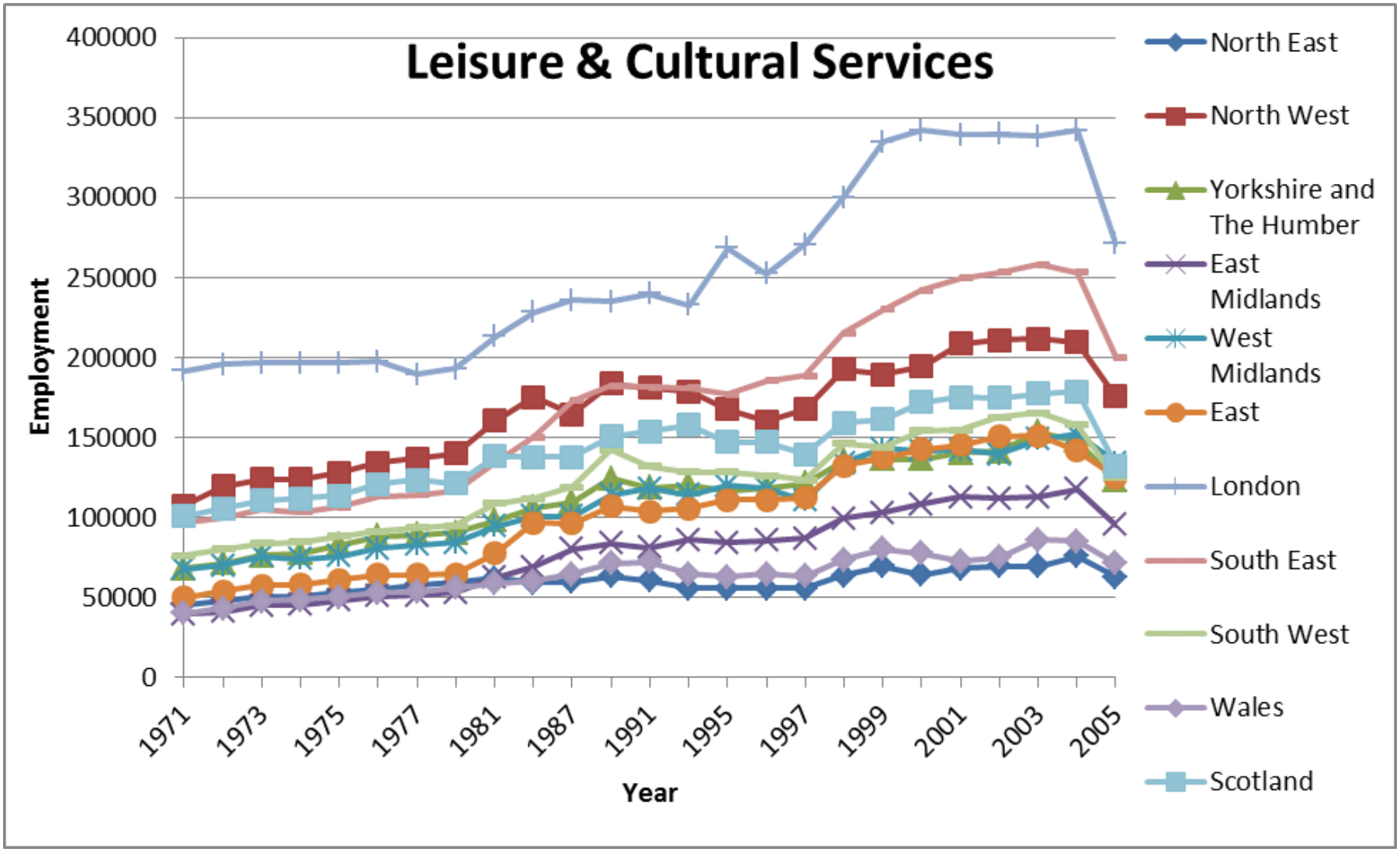


Figure 5: Cumulative Regional Employment: Region Effects

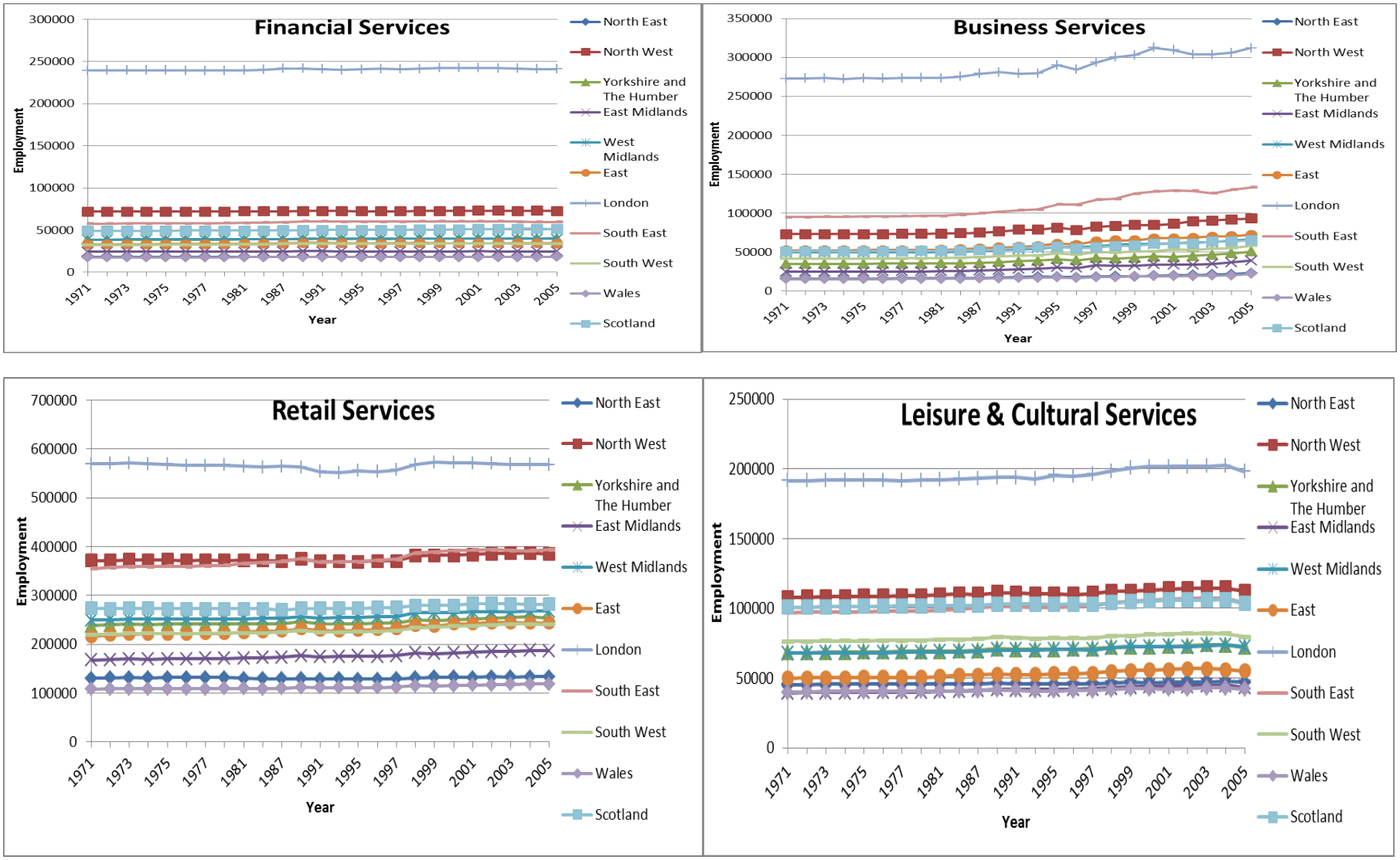


Figure 6: Cumulative Regional Employment: Industry Mix Effects

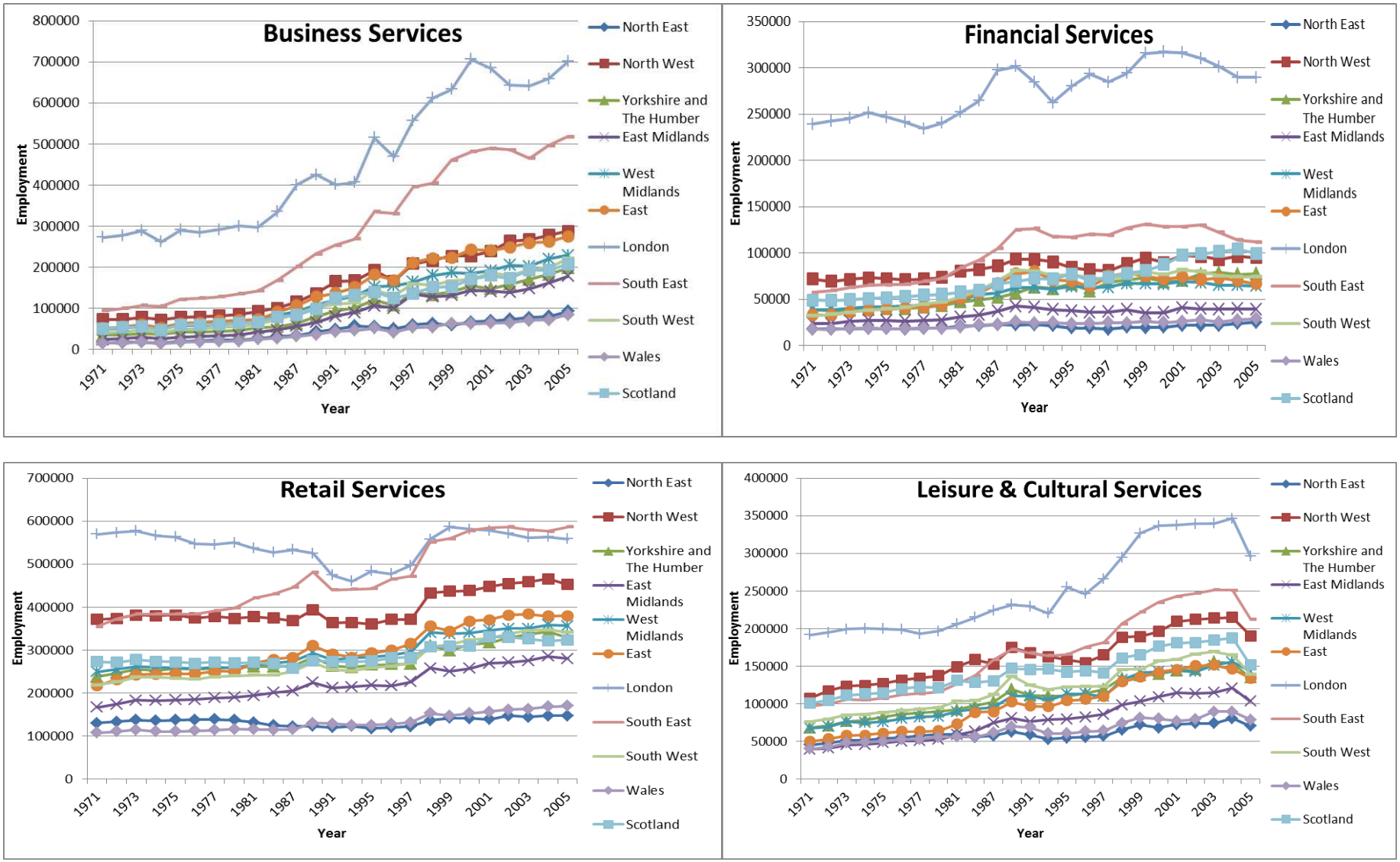


Figure 7: Cumulative Regional Employment: Region-Industry Interaction Effects

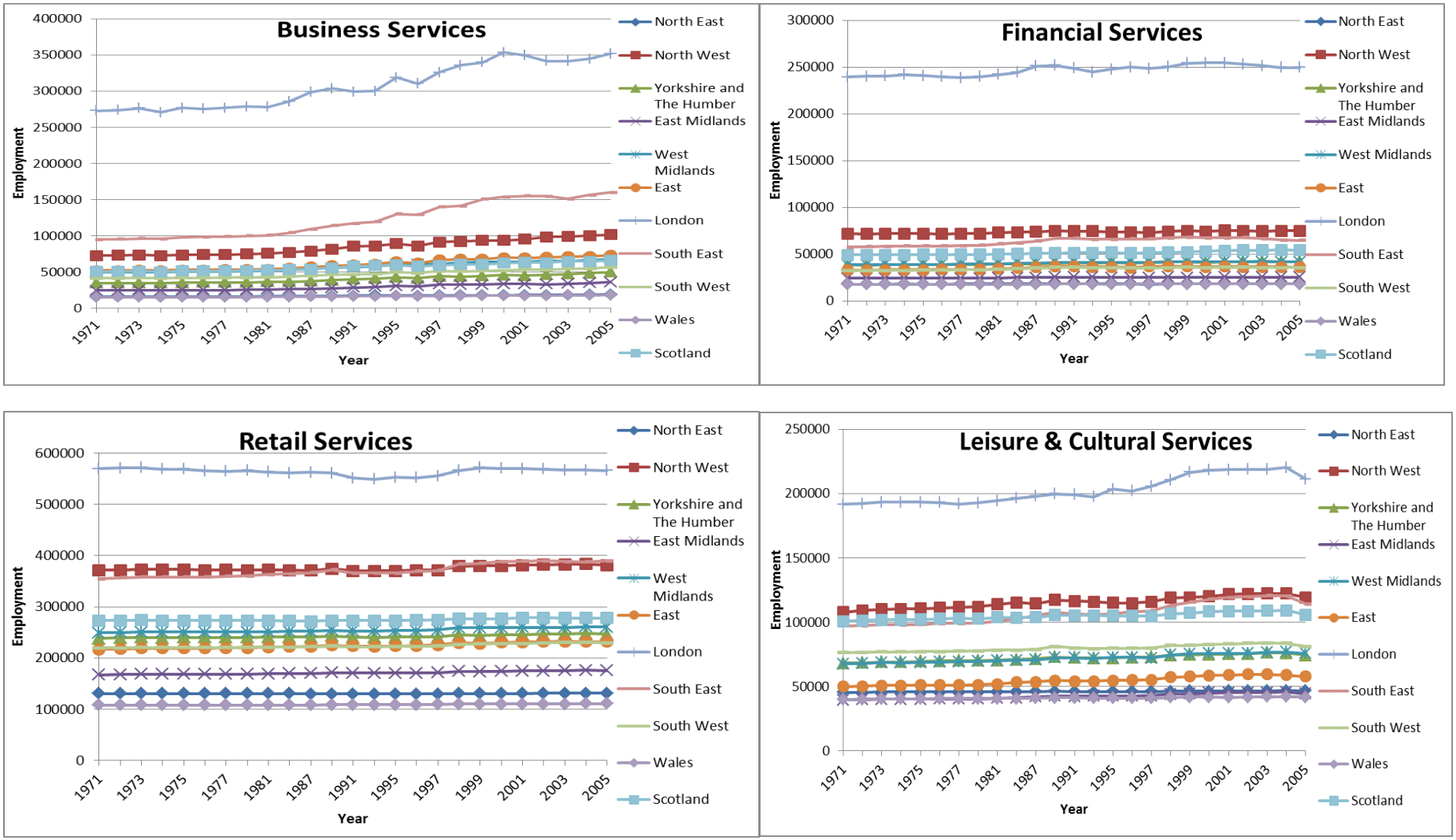
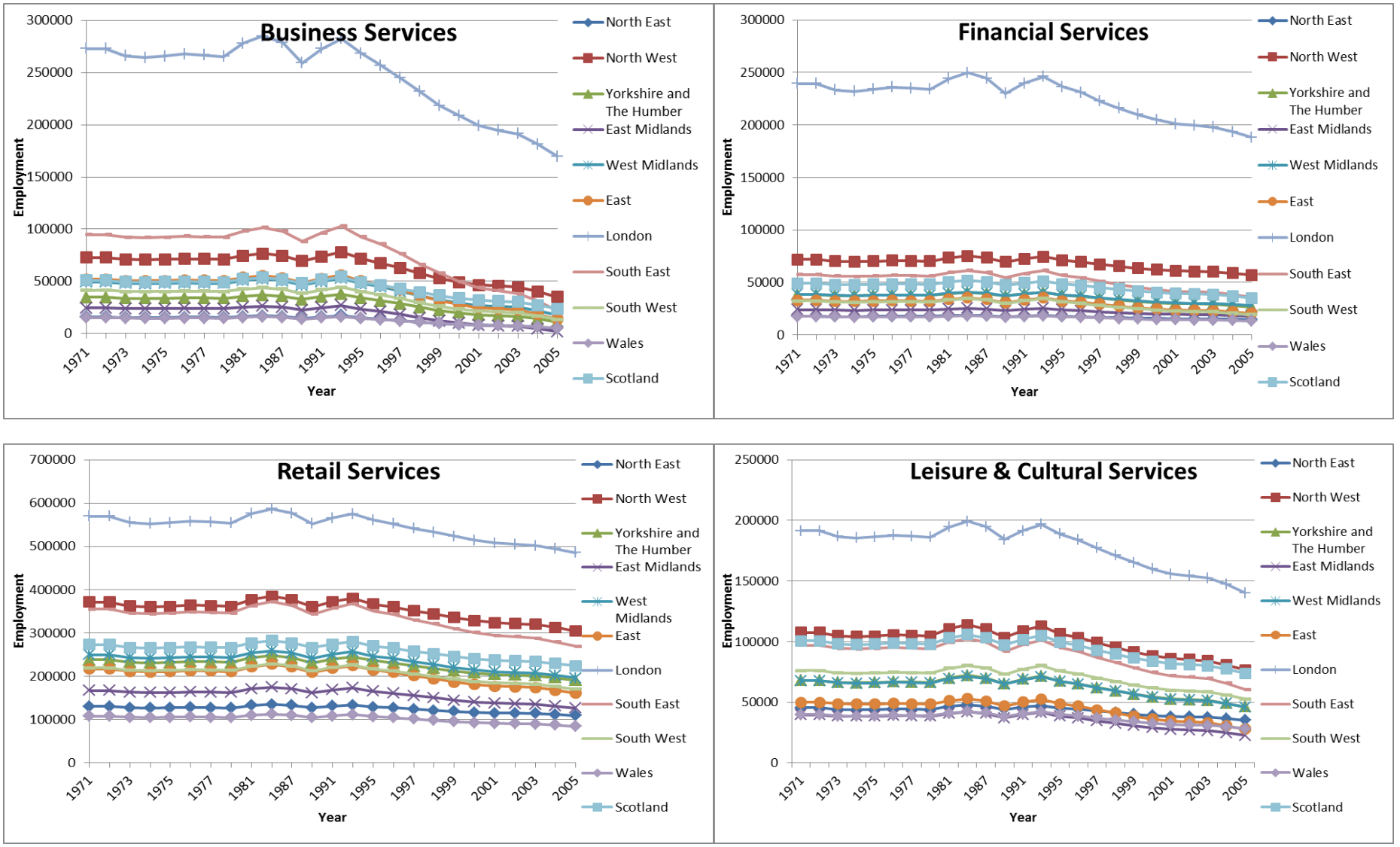


Figure 8: Cumulative Regional Employment: Allocation Effects



Appendix 1: Defining the Service Sector

Sub-Sector	SIC68	SIC80	SIC92
Business Services	863 Property owning and managing, etc. 864 Advertising and market research 865 Other business services 866 Central office not allocatable elsewhere 871 Accountancy services 873 Legal services 876 Research and development services 879 Other professional, scientific services	834: House/estate agents 835: Legal services 836: Accountants, auditors, tax experts 837: Professional/technical services (Other) 838: Advertising 839: Business services 850: Owning/dealing in real estate 940: Research/development	701: Real estate activities with own property 703: Real estate activities 721: Hardware consultancy 722: Software consultancy and supply 723: Data processing 724: Data base activities 725: Maintenance/repair: office machinery etc 726: Other computer related activities 731: Research: natural sciences/engineering 732: Research: social sciences/humanities 741: Accounting/book-keeping activities etc 742: Architectural/engineering activities etc 743: Technical testing and analysis 744: Advertising 745: Labour recruitment etc 748: Miscellaneous business activities nec
Financial Services	860 Insurance 861 Banking and bill discounting 862 Other financial institutions	814: Banking/bill-discounting 815: Other financial institutions 820: Insurance: not compulsory social security 831: Activities auxiliary to banking/finance 832: Activities auxiliary to insurance	651 : Monetary intermediation 652 : Other financial intermediation 660 : Insurance and pension funding 671 : Activities auxiliary to financial intermediation 672: Activ. auxil. to insur./pension funding
Retail Services	810 Wholesale distribution of food and drink 811 Wholesale distribution(petrol products) 812 Other wholesale distribution 820 Retail distribution of food and drink 821 Other retail distribution 889 : Hairdressing and manicure 892 Laundries 893 Dry cleaning, job dyeing, etc. 894 Motor repairers, distributors, garages, etc. 895 Repair of boots and shoes	611 Wholesale distribution: raw materials, etc. 612 Wholesale distribution: fuels, ores, etc. 613 Wholesale distribution: timber etc. 614 Wholesale distribution: machinery, etc. 615 Wholesale distribution: household goods 616 Wholesale distribution: textiles, etc 617 Wholesale distribution: food, etc/tobacco 618 Wholesale distribution: chemists' goods 619 Other wholesale distribution 641 Food retailing 642 Confectioners, newsagents; off-licences 643 Dispensing/other chemists 645 Retail distribution: clothing 646 Retail distribution: leather goods 647 Retail distribution: household textiles 648 Retail distribution: household goods, etc 651 Retail distribution: motor vehicles/parts 652 Filling stations (motor fuel/lubricants) 653 Retail distribution: books, stationery, etc 654 Other retail distribution (non-food) 656 Mixed retail businesses 671 : Repair/servicing of motor vehicles 672 : Repair of footwear/leather goods 673 : Repair of other consumer goods	502: Maintenance and repair of motor vehicles 503: Sale of motor vehicle parts/accessories 505: Retail sale of automotive fuel 511: Wholesale on a fee or contract basis 512: Wholesale of agric. raw materials etc 513: Wholesale of food, beverages and tobacco 515: Wholesale of non-agricultural products etc 516 : Wholesale of machinery, equipment etc 517: Other wholesale 521: Retail sale in non-specialised stores 522: Retail: food, etc in specialised stores 523: Retail: pharmaceutical goods etc 524: Other: new goods in specialised stores 525: Retail: second-hand goods in stores 527: Repair of personal and household goods

		981 : Laundries, dyers/dry cleaners 982 : Hairdressing/beauty parlours 989 : Personal services (Other)	
Leisure and Cultural Services	881 Cinemas, theatres, radio, etc. 882 Sport and other recreations 883 Betting and gambling 884 Hotels/other residential establishments 885 Restaurants, cafes, snack bars 886 Public houses 887 Clubs	661 : Restaurants, snack bars, cafes, etc. 662 : Public houses/bars 663 : Night clubs/licensed clubs 665 : Hotel trade 667 : Other tourist/short-stay accommodation 971 : Film production, distribution/exhibition 974 : Radio/television services 979 : Sport/other recreational services	551 : Hotels 553 : Restaurants 554 : Bars 921 : Motion picture and video activities 922 : Radio and television activities 923 : Other entertainment activities 926 : Sporting activities 927 : Other recreational activities